⑲ Europäisches Patentamt
European Patent Office
Office européen des brevets

⑪ Publication number: **0 220 392**
A3

⑫
EUROPEAN PATENT APPLICATION

㉑ Application number: **86110459.4**

(51) Int. Cl.⁴: **H01L 27/10 , H01L 21/82**

㉒ Date of filing: **29.07.86**

㉚ Priority: **30.10.85 US 792996**

㊸ Date of publication of application:
06.05.87 Bulletin 87/19

(84) Designated Contracting States:
DE FR GB IT

(88) Date of deferred publication of the search report:
14.06.89 Bulletin 89/24

(71) Applicant: **International Business Machines Corporation**
Old Orchard Road
Armonk, N.Y. 10504(US)

(72) Inventor: **Goth, George Richard**
68 Todd Hill Road
Poughkeepsie New York 12603(US)
Inventor: **Malaviya, Shashi Dhar**
Orbit Lane
Hopewell Junction New York 12533(US)

(74) Representative: **Klein, Daniel Jacques Henri**
Compagnie IBM France Département de Propriété Intellectuelle
F-06610 La Gaude(FR)

(54) A trench-incorporated monolithic semiconductor capacitor and high density dynamic memory cells including the capacitor.

(57) A high density integrated circuit structure, for example a dynamic memory cell, is described which includes an active/passive device in combination with a capacitor structure. The capacitor structure is of the polysilicon-oxide-silicon type and is formed on the sidewalls of a mesa-shaped and dielectrically isolated region of silicon material resulting from the formation of an isolation trench in the silicon. The trench is filled with a plastic material, such as polyimide. The capacitor is formed by the isolated region of silicon material (14) which functions as the first capacitor plate, a doped polysilicon layer (22a) provided on the vertical walls of the mesa serving as the second capacitor plate and a thin dielectric layer (21) interposed between the two plates serving as the capacitor's dielectric. Since the polysilicon is wrapped around the periphery of the mesa as a coating on the vertical sidewalls thereof, it gives rise to a large storage capacitance without an increase in the cell size.

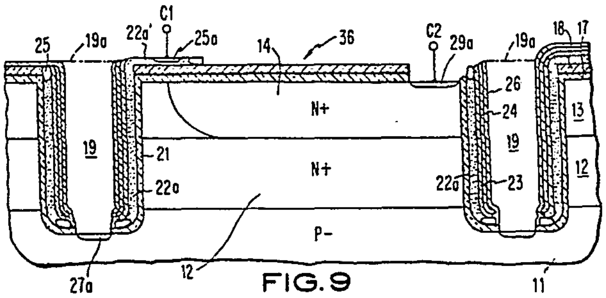

FIG.9

EP 0 220 392 A3

European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 86 11 0459

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	GB-A-2 138 207 (HITACHI) * Figures 5B-11; page 4, line 59 - page 5, line 106 * ---	1,7-11, 13,16, 20,23-27,29, 33-35	H 01 L 27/10 H 01 L 21/82
A	IBM TECHNICAL DISCLOSURE BULLETIN, vol. 25, no. 11A, April 1983, pages 5670-5671, New York, US; D.G. CHESEBRO et al.: "Bioplar Dynamic Random-access memory cell" * Whole article * ---	13,14, 18,29	
A	EP-A-0 088 451 (HITACHI) * Figures 8-15; page 12, line 1 - page 19, line 22 * ---	1,10,11,13,16, 20,27, 29,33-35	
A,P D	EP-A-0 166 142 (IBM) * Figures 1-9; page 7, line 5 - page 10, bottom line * -----	1,13,29,33	**TECHNICAL FIELDS SEARCHED (Int. Cl.4)**
			H 01 L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30-03-1989	MACHEK,J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document